
Question 1: Do any of you place an alarm or upper limit on the operating pressure drop (dP) through a hydrotreater reactor circuit (preheat exchangers to High Pressure Separator)? If yes, what is the basis for the maximum dP?

Minh Dimas (CITGO)

One of our refineries has developed limits for pressure drop through the reactor circuit. The maximum allowable pressure drop is determined by the difference between the upstream reactor or heat exchanger design pressure and the set pressure of the relief valve on the high-pressure separator. The purpose of the alarm is to ensure that the upstream vessel's design pressure will not be exceeded before the pressure at the downstream relief valve reaches the set pressure.

Tim Lewer (Shell)

Pressure drop limitations across the high-pressure section of a hydrotreating unit are common in refineries. They can be set for many reasons, including but not limited to

1. Equipment design – High pressure separators are controlled to provide the proper suction pressure to the recycle compressor. If the reactor and exchanger train build high pressure drop, the maximum allowable pressure in those vessels may be exceeded in order to maintain the proper high pressure separator pressure. A pressure drop alarm may be set to avoid exceeding the upstream equipment design pressures.
2. Reactor catalyst monitoring – High differential pressure alarms are common for entire reactor trains if individual catalyst bed pressure drop indication is not available. This is important for catalyst health monitoring, especially if guard beds are not present. In addition, reactor internals may have specific differential pressure limitations.

Exchanger fouling detection – It is not typical to have a lot of pressure or temperature indication on the feed/effluent exchanger train so it can be difficult to detect exchanger fouling.

Martin Gonzalez (BP)

The buildup of system pressure would push a centrifugal recycle compressor back on its curve, so setting a pressure drop limit across the entire reactor circuit would help prevent compressor surge.

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